

# CURRENT LITERATURE

## NOTES FOR STUDENTS

**Quantitative relations of regeneration.**—REED<sup>1</sup> has contributed a new quantitative study of growth in pruned trees as compared with unpruned, with particular reference to such questions as whether the growth response is merely the restoration of lost parts, in what manner the amount of regeneration is correlated with length, and number of buds of the mother shoot; also what light these relations afford in the problem of the dominance of the shoot apex. He finds no correlation between the length of mother shoots and the amount of new growth produced by them, whether pruned or unpruned. On the other hand, shoots pruned the previous winter produced about 65 per cent more total growth than comparable unpruned shoots; the degree of heading back had little effect on the amount. Hence, regeneration following pruning is not a tendency to restore lost parts, but in terms of growth rate of the shoot is taken to indicate increased activity of the growth catalyst. In connection with the characteristically greater growth of laterals at the distal end of a pruned shoot, the conclusion is reached that this greater activity results from the elimination of the growth-inhibiting chalcones produced in the apical part of the shoot which normally keep the lateral buds in dormancy. The alternative hypothesis that pruning reduces the number of potential growing points, hence permits of greater development of the remaining buds, is rejected because it was found that the more heavily pruned mother shoots, that is, the shoots in which the number of remaining buds was least, failed to make more total lateral growth than the longer mother shoots. It is worthy of note that according to the author's hypothesis of basipetal migration of a growth-inhibiting substance, the greatest concentration, and hence the most pronounced inhibiting effect, is at the base of the shoot. When a mother shoot is pruned to a few basal buds, however, the laterals developing from such buds become longer than laterals of less severely pruned shoots. This would seem to be evidence indicating some effect from reduction of competition between the several buds.

LOEB<sup>2</sup> reaches a somewhat different conclusion from experiments on regeneration in *Bryophyllum*, in which the weight of shoots produced from the

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<sup>1</sup> REED, H. S., Correlation and growth in the branches of young pear trees. Jour. Agric. Res. 21:849-876. pl. I. 1921.

<sup>2</sup> LOEB, JACQUES, The quantitative basis of the polar character or regeneration in *Bryophyllum*. Science 54:521-522. 1921.

apical buds of an intact defoliated stem was compared with the total weight of shoots produced from similar stems divided into portions of one node each. From the approximate equivalence of these quantities he concluded that "the polar character of the regeneration of shoots is due to the fact that all the material available for growth reaches the apical and none of the other nodes of a long piece of stem." The relation of this conclusion to LOEB'S well known earlier work on regeneration in *Bryophyllum* is not quite clear to the reviewer, since nothing appears here concerning the effect of a growth-inhibiting hormone by which is to be explained the dominance of the apical and the inhibition of the lateral buds.

Although the reviewer is aware that the two cases are not strictly comparable, it would seem that if inhibition of lateral buds is the effect of a basipetally migrating growth-inhibiting substance, the maximum effect of "pruning" would result from complete isolation of each bud from the deleterious effects of its neighbors, as LOEB was able to do in *Bryophyllum*, and as was impossible in REED'S experiments with the pear. Yet the experiment with *Bryophyllum* resulted in the production of a greater amount of new growth from the intact than from the divided stem.

The arguments in support of the several theories to account for the dominance of the apical portion of a shoot have been reviewed recently by CHILD,<sup>3</sup> and several objections to the hypothesis of growth-inhibiting hormones pointed out. It would appear that further progress toward the solution of this problem must wait on more adequate information concerning the anatomical relations of apical and lateral buds, and of tissue changes in regeneration. For instance, the transport efficiency of the vascular supply to the apical as compared with lateral buds does not appear to have been adequately investigated. The relative age of the terminal as compared with other buds is important in this connection. In shoots with the indeterminate growth habit the apical bud may establish its dominant rôle in the axial gradient, which it thereafter retains, in the judgment of CHILD, by virtue of its priority. In shoots of limited apical growth different relations may obtain. Again, if inhibition of a growing tip is a transmission through protoplasmic connections rather than the physical transportation of a substance through the vascular tracts, as CHILD holds on the basis of the behavior of simple animals and non-vascular plants, evidence of cytoplasmic cell connections should be sought in such active portions of the shoot. The effect of callus deposition in the sieve tubes and of changes in the phloem (both sieve tubes and parenchyma) toward lignification should be determined in relation to a possible gradient in transport efficiency from apex to base. The coordination of histological and physiological studies in this problem is greatly to be desired.—FREEMAN WEISS.

**The rapprochement in ecology.**—A notable feature in the development of ecology has been the marked divergence between the American and Continental

<sup>3</sup> Amer. Jour. Bot. 8: 286-295. 1921.